

# Intracoronary thrombolytic treatment: another hazard

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**SUMMARY** A patient with acute anterior myocardial infarction was treated with intracoronary thrombolysis. At cardiac catheterisation the first contrast injection into the left coronary artery dislodged some of the thrombus occluding the left anterior descending coronary artery. The thrombus embolised into the circumflex artery where fortunately it fragmented without causing occlusion.

The risk of detachment of thrombus should be borne in mind when angiography and thrombolytic treatment are considered in acute myocardial infarction.

Myocardial infarction is nearly always associated with thrombotic occlusion of the coronary artery supplying the area of infarcting myocardium.<sup>1</sup> Intracoronary thrombolytic treatment can restore vessel patency if treatment is begun early after the onset of infarction.<sup>2</sup> Evidence that thrombolytic treatment might reduce mortality<sup>3,4</sup> is only just emerging, however, and limitation of infarct size may be confined to those patients in whom thrombolysis is achieved soon after the onset of infarction.<sup>5,6</sup> The risks and benefits of thrombolysis are still being debated.

Coronary angiography in the context of acute myocardial infarction carries a definite but unknown risk. Five of a series of 83 patients undergoing angiography before thrombolysis died<sup>7</sup>; in two patients death was attributable to the angiographic procedure. Our case report illustrates a hitherto unrecognised and potentially hazardous complication of angiography in acute myocardial infarction.

## Case report

A 56 year old man was admitted two hours after the onset of typical cardiac pain. The admission electrocardiogram showed the features of an acute anterior myocardial infarction (ST segment elevation in leads VI-V5, I, and aVL; ST segment depression in

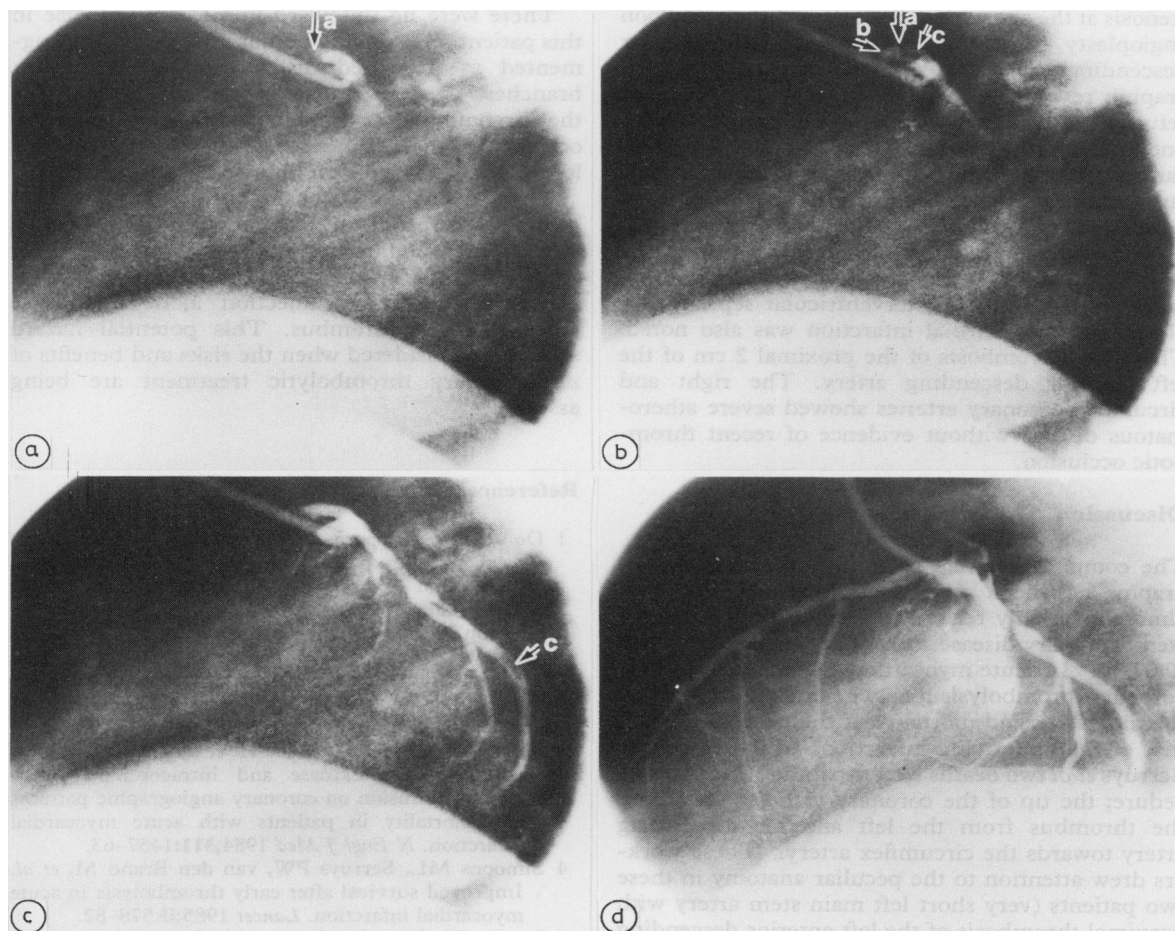
leads II, III, and aVF). He was considered to be suitable for thrombolytic treatment with streptokinase for which he gave written consent.

Left coronary arteriography was performed by the Judkins technique from the right femoral artery by means of an 8F 4 cm left coronary catheter. This was primed with contrast medium (Hexabrix 320) when it reached the descending thoracic aorta and it was advanced easily under fluoroscopic control into the left coronary ostium. Simultaneous biplane (posteroanterior and lateral; then right and left anterior oblique) 35 mm cine films of hand injections of 8 ml Hexabrix 320 were recorded at 50 frames per s with Arritechno cameras from Siemens 15 cm image intensifiers. The angiograms were subsequently displayed and analysed frame by frame with a Cipro 35 projector.

A dominant left coronary artery was shown with proximal occlusion of the left anterior descending branch and stenoses (more than 75% reduction in luminal diameter) in the circumflex artery and its obtuse marginal and posterior descending branches.

The cine film of the first injection of contrast medium clearly showed the occlusion site in the left anterior descending artery (at point "a" in Fig. a) by the seventh frame from the beginning of contrast injection. Seven frames later, contrast medium suddenly filled the left anterior descending artery more distally (to point "b" on Fig. b), and there was a coincidental appearance of an intraluminal filling defect ("c" in Fig. b). During the course of the next 14 frames the filling defect, which remained constant in shape and size, moved first retrogradely to

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**Figure** Left coronary arteriogram in the left lateral view. Frames a, b, and c are from the same run of cine film, taken at 50 frames/s after the first injection of contrast into the left coronary artery. In frame a, "a" marks the site of occlusion in the left anterior descending artery. At this time, seven frames from the beginning of contrast injection, the circumflex artery is only just beginning to be opacified. In (b), taken seven frames later, "c" marks the filling defect caused by the thrombus which has been displaced from the occlusion in the left anterior descending artery. Contrast now fills the left anterior descending artery more distally to "b" (for comparison "a" on frame (a) is reproduced on frame (b)). In (c), taken 14 frames after (b), the circumflex artery is well opacified but the left anterior descending artery remains occluded. The thrombus (shown by "c") has embolised from the left anterior descending artery into the circumflex artery. (d) is a frame from a cine film taken after successful thrombolysis and angioplasty of the left anterior descending artery. There is no obstruction of circumflex branches.

the bifurcation of the left coronary artery and then anterogradely into the circumflex artery ("c" in Fig. c). Over the next eight frames it fragmented as it passed into distal circumflex branches. This sequence is interpreted as representing detachment and embolisation of part of an occluding thrombus in the left anterior descending artery during the course of the single injection of contrast medium. The catheter tip, clearly seen in the two planes, was in the ostium of the left coronary artery, well clear of

the origin of the left anterior descending artery. Careful analysis of the cine film showed no evidence of embolus from the catheter itself.

No symptoms or electrocardiographic changes accompanied the dislodgement of thrombus. The branches of the circumflex artery were all patent on subsequent arteriograms (Fig. d).

Streptokinase infusion into the left coronary artery (4000 IU per min) achieved thrombolysis in 30 min. Repeat angiography showed an important

stenosis at the site of the previous occlusion. Balloon angioplasty of the stenosis of the left anterior descending artery was easily performed; the angiographic result was good (Fig. d) and the patient returned to the coronary care unit. His progress was uneventful until four days later when he had electrocardiographic evidence of reinfarction and ventricular tachycardia and then ventricular fibrillation developed from which he could not be resuscitated.

Necropsy showed an extensive recent transmural myocardial infarction affecting the anterolateral wall and two thirds of the interventricular septum. An old inferior myocardial infarction was also noted. There was thrombosis of the proximal 2 cm of the left anterior descending artery. The right and circumflex coronary arteries showed severe atherosclerotic disease without evidence of recent thrombotic occlusion.

## Discussion

The complication rate of routine coronary angiography has been well documented. Deaths are almost invariably related to severe, often left main stem, coronary disease.<sup>8</sup> Coronary embolism is rare (0.07%).<sup>8</sup> In acute myocardial infarction and intracoronary thrombolysis it may be difficult to separate the morbidity and mortality of the procedure from that of the underlying infarction. In the report by Serruys *et al* two deaths were attributable to the procedure; the tip of the coronary catheter dislocated the thrombus from the left anterior descending artery towards the circumflex artery.<sup>7</sup> These workers drew attention to the peculiar anatomy in these two patients (very short left main stem artery with proximal thrombosis of the left anterior descending artery).

In our patient the left main stem artery was a good length and the occlusion of the left anterior descending artery was about 2 cm from its origin. Embolisation of the occluding thrombus occurred as a result of the injection of contrast medium, not as a result of any contact of the catheter with the thrombus. We believe this to be the first report of such an occurrence. Once the thrombus had become detached its subsequent course was determined by the flow of blood and continued contrast medium injection.

There were no untoward immediate sequelae in this patient, presumably because the thrombus fragmented as it passed distally in the circumflex branches. The consequences of an acute occlusion of the circumflex artery in a patient with an acute occlusion of the left anterior descending artery and a left dominant system could have been disastrous.

Embolisation of coronary thrombus may well occur more readily in acute myocardial infarction when the thrombus is fresh and probably loosely attached to the coronary artery. We have demonstrated that contrast injection alone can cause detachment of thrombus. This potential hazard should be considered when the risks and benefits of intracoronary thrombolytic treatment are being assessed.

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